CHAPTER TWO
Aviation Demand Forecasts

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As indicated previously, the demand for aviation services has, historically, been closely related to the socio-economic character of its area of influence. As population and relative income grow, there is generally a corresponding growth in aviation demands.

FORECAST PURPOSE

Aviation demand forecasts serve four purposes in development of the master plan. Specifically, they provide the basis for:

- Determining the necessary capacity of the general aviation area, and ground access system serving the airport;
- Determining the airport's role, and resulting size, and type of existing facility expansion or new construction;
- Estimating the potential environmental effects, such as noise and air pollution on the surrounding community from the airport's operation; and
- Evaluating the financial feasibility of alternative airport development proposals.

Approach

The forecasting of any type of future activity is an art rather than a science. The development of aviation demand forecasts are conducted in two distinct phases: The analytical, followed by the judgmental. In general, past aviation activity data are examined in anticipation of identifying past trends that will give an indication of future activity. Trends in the local economy are factored into future activity levels, as well.

During the analytical process, the past trends of the aviation demand elements are extended into the future using a variety of techniques and incorporating a number of assumptions. Projections are developed by combining historical trends with various analytical procedures. After preparing a number of projections, the analyst is able to identify a range of growth within which the true trend will most likely fall.

The second phase of demand forecasting requires experienced professional judgment. The analyst examines various growth projections for each demand element, studies the character of the community and how it will influence the particular demand element, and then makes a determination of the "preferred" forecast.

Projection Methodology

The most reliable approach to estimating aviation demand is through the use of more than one analytical technique. Methodologies usually considered for airport master planning include regression analysis, trend line analysis, economic growth indicators, and survey analysis.

Regression Analysis

The forecasts of aviation demand (the dependent variable) are projected on the basis of one or more external indicators, the independent variables. Historical values for both variable types are analyzed to determine the relationship between the independent and dependent variables. This relationship may then be used to project the dependent variable with a forecast or projection of the independent variables.

In aviation forecasting, elements of aviation activity, such as passengers and based aircraft, are the dependent variables. Population, per capita income, economic factors, and other socioeconomic data are frequently used independent variables.

Trend Line Analysis

Trend analysis is probably the simplest and most familiar forecasting technique and is one of the most widely used methods. Historical data is extended into the future, providing an estimate of the aviation demand element in future years.

A basic assumption of this trend analysis technique is that the historical levels for aviation demand will continue and exert a similar influence on future demand levels. As broad as this assumption may be, such a projection method often does serve as a reliable benchmark against which other projections may be compared.

Previous Forecasts

Previous forecasts such as the Cochise County Airport System Plan, the State Aviation Needs Study, and FAA forecasts will be used for information and for comparison purposes.

Pilot/Aircraft Owner Opinion Survey

Surveys can be developed that will provide an indication of present and future levels of aviation demand. For this study, personal interviews, mail-back questionnaires, and structured personal observation were used. During the inventory process, 80 surveys were distributed to pilots and aircraft owners in the Willcox area. The survey is used to verify current activity levels, facility needs, and overall performance of the airport. The opinion survey verifies that the Cochise County Airport will maintain and grow in number of based aircraft during the planning period. Of the existing owners none plan to sell their aircraft and three indicate they will add or purchase larger aircraft. The recorded activity levels match the levels of usage indicated by the pilots at the airport. The survey and results are included in the appendix.

Forecast Development

The analytical projections serve as a basis for developing aviation demand forecasts through the application of experienced, professional judgment.

Informed judgment is perhaps the most valuable factor in forecasting any aviation demand element. Many variables can be accounted for in the analysis and assigned the proper weight, as viewed by the forecaster. Such variables include: mix of aircraft fleet, changes in a community's competitive status, long-term demographic shifts, and environmental limitations.

Forecasting Considerations

Convenient, safe, and rapid accessibility is one of the single most important variables affecting community growth and economic vitality. In terms of its economic impact, general aviation remains a significant and important element in the overall transportation network. The benefits from general aviation activity include business applications, police and hospital use, flight training, etc.

General aviation is the largest, most significant element of the national air transportation system. It constitutes 98 percent of all aircraft in use today. In 1995, the scheduled airlines served 554 airports in the United States, while there are over 5,500 public general aviation airports nationwide[1]. In terms of the number of aircraft, hours flown and accessibility, general aviation is definitely a major contributor to the national air transportation system.

[1]National Plan of Integrated Airport Systems - April, 1995

In addition, general aviation provides a variety of public benefits to the surrounding area. It is no coincidence that general aviation has contributed to the national trend of manufacturing and service industries locating away from larger metropolitan areas to smaller communities. Typically, smaller communities are able to offer lower corporate and residential tax rates, closer access to raw materials and natural resources, and a superior working environment. As evidence of this trend, general aviation provides a time-saving link for corporative travelers which makes airports such as Cochise County Airport extremely attractive.

The purpose of this section is to quantify general aviation demand for the Cochise County area during the short, medium, and long-range planning periods (Phases I thru III). National trends and forecasts, such as the *National Plan of Integrated Airport Systems (NPIAS)* and previous Cochise County Airport planning documents were analyzed to produce forecast data for the airport.

The forecasts, combined with the demand/capacity analysis, will be used to determine long-range general aviation facility requirements to be scheduled during the appropriate planning period. Aviation demand forecasts have been prepared for:

- Based Aircraft
- Aircraft Operations
- Aircraft Mix
- Annual Instrument Approaches (AIAs)

BASED AIRCRAFT FORECASTS

The most important factor in the development of aviation activity forecasts at an airport serving general aviation is the number of based aircraft. At Cochise County, to determine future levels of based aircraft, regression analysis techniques and market projections were performed analyzing the social and economic characteristics for Cochise County and primarily the Willcox region. These were then compared with previous forecasts, compared for accuracy, and utilized where appropriate.

Previous Forecasts

Previous forecasting for Cochise County Airport was completed in the Arizona State Aviation Needs Study - 1995, in the Cochise County Airport System Plan - 1994, and as part of the *National Plan of Integrated Airport Systems* (NPIAS).

The Cochise County Airport System Plan (CCASP) contains a specific forecast of based aircraft for the county and the airport. It shows 28 aircraft in 1997 and estimates increases to 40 by the year 2012. *The State Aviation Needs Study (SANS)* completed one year after the CCASP revised the projections slightly downward and estimates 32 aircraft based at the airport by the year 2010. The (NPIAS) shows a 28 based aircraft projection but only has a short, five-year forecast horizon. The previous forecasts will be used for comparison purposes to judge the validity of the statistical projections conducted for this Master Plan study.

Trend Line Analysis

The Trend Line analysis indicates how the airport has performed in regard only to historic based aircraft increases. From 1980 to 1997, based aircraft increased by 2 aircraft. The trend line based upon past figures was initiated in 1980 and computes to an annual growth rate of 0.5 percent.

Regression Analysis

As previously shown in Table 1.7, based aircraft at the airport have been slowly increasing. Regression analyses techniques were performed to project based aircraft at the airport through the planning period. The regression yielded an R squared of 88 percent which is 8 points above the accepted confidence level. Per capita income, adjusted per capita income, and Willcox population projections were used as the independent variables.

The regression analysis will be used as the preferred forecast. The forecast is based upon the most recent local and regional data and is in line with other recent aviation studies. The average annual growth rate has been computed at 1.756%.

National Growth Rate

According to the latest FAA general aviation forecast figures[2] it is estimated that the national active general aviation fleet will decline through 1996. However, starting in 1997, there will be a 0.4 annual percent growth rate in the general aviation fleet through the year 2007. This increase will be driven primarily be greater business use of turbine-powered aircraft. The turbine general aviation segment is forecast to grow at an annual rate of approximately 1.5 percent. This statistic reinforces the national trend toward the use of larger and more sophisticated aircraft for business use. Additionally, the full impacts of

[2] F.A.A. Aviation Forecasts - March, 1996

the General Aviation Revitalization Act is still unknown. The Act which limits aircraft product liability has sparked new production of single engine aircraft. The new business has not yet reached full production and could increase the overall general aviation fleet.

"Preferred" Forecast

Table 2.1 and Figure 2.1 shows the comparison based aircraft forecasts..

Table 2.1
Based Aircraft Forecasts

Year	Regression "Preferred" [1]	Historic Trend [1]	Cochise County System Plan [2]	State Aviation Needs Study [3]	FAA Trend [4]
Existing	24	24	24	24	24
2002	24	26	32	28	25
2007	25	26	35	30	25
2012	28	27	40	31	26
2017	34	27	--	32	26

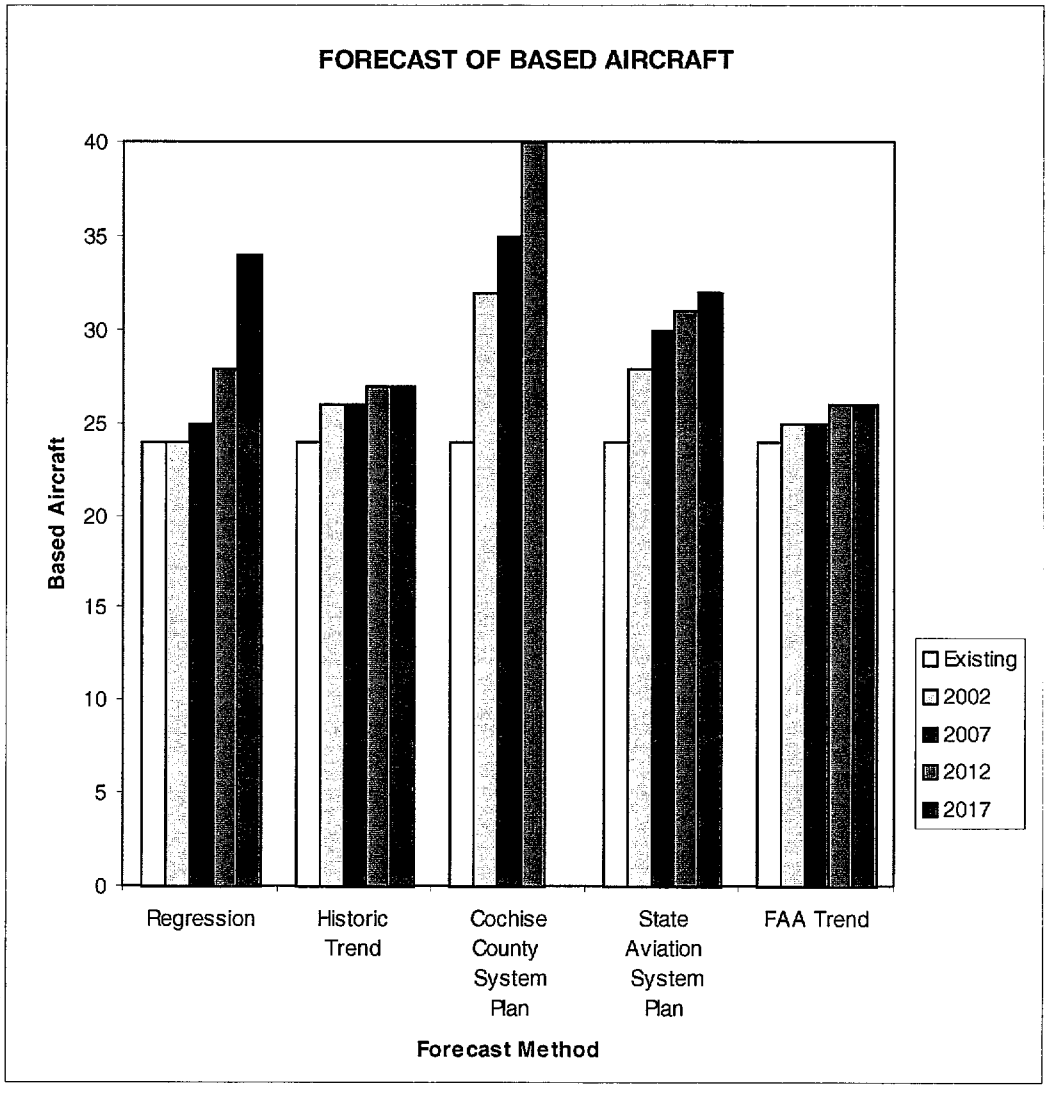
Sources:
1 BWR Corporation Forecasts, 1997
2 Cochise County Airport System Plan, 1994
3 Arizona State Aviation Needs Study, 1995
4 FAA Forecasts, 1996

AIRCRAFT OPERATIONS FORECAST

The aircraft operations forecast is developed by using the based aircraft figures and then by applying percentage-usage rates which most realistically reflect trends at Cochise County Airport. The most recent general aviation operations (no military) are then divided by the current level of based aircraft (24). For Cochise County Airport, 270 operations will be used as the baseline for operations per based aircraft. The operations per based aircraft is in line with results of the pilot/aircraft owner survey.

Aircraft operations are identified as local and itinerant operations. Local operations are performed by those aircraft which take off and land at the same airport and operate within the local vicinity of the airport. Itinerant aircraft operations are those in which the aircraft land or take off at one airport and have a terminus of flight at another airport. It is important to note that local and itinerant operations can be performed by a based aircraft or a foreign aircraft based at another airport. Military operations are any operation made by any branch of the United States Armed Forces.

Figure 2.1
Forecast of Based Aircraft



The historic local/itinerant split of total operations for the past 17 years was computed as 50% local and 50% itinerant. Recently, itinerant operations are estimated to account for 55% of the total operations and will increase to 58% with recognition of the increasing percent of itinerant operations since 1980.

Military operations at Cochise County Airport make up only a small portion of air traffic activity. Military activity is a result of congressional funding and is not dependant upon local or regional economic influences. Therefore, military operations are expected to remain minimal at about 500 annual operations, throughout the planning period.

A summary of the aircraft operations forecast is given in Table 2.2.

Table 2.2
General Aviation Aircraft Operations Forecast

Year	Based Aircraft	General Aviation Operations Per Based Aircraft	Local Operations	Itinerant Operations			Total General Aviation Forecast Operations
				General Aviation	Air Taxi	Military	
Existing	24 *	270	2,990	3,510	0	500	7,000 *
2002	24	270	2,860	3,640	0	500	7,000
2007	25	270	2,970	3,780	0	500	7,250
2012	28	270	3,251	4,309	0	500	8,060
2017	34	270	4,146	5,034	0	500	9,680

Note (*) - Current based aircraft and annual operations

AIRCRAFT MIX FORECAST

The number of operations performed by the various types of aircraft at Cochise County Airport is required to determine the present and ultimate design requirements, weight limitations, and environmental effects associated with future airport activity. The aircraft "mix" of aircraft is a design feature using aircraft characteristics (wingspan, approach airspeed and weight) for determined airfield criteria. The mix of these different "categories" of aircraft is an important feature to determine anticipated design, structural and material needs.

There are two basic functional means to classify aircraft for design purposes; (1) by the Aircraft Approach Category, which is based on the aircraft's final approach speed; and (2) by the Airplane Design Group, which is based on the aircraft's wingspan. The Aircraft Approach Category is classified from A to E, and the Airplane Design Group is classified from Group I to IV. Combined, the two classifications produce an Airport Reference Code

(ARC) which yields specific information about the type of aircraft around which the airport is ultimately designed.

The aircraft mix forecast was developed on the basis of information assembled in the inventory analysis element and on national trends, aircraft inventories, and anticipated future requirements of the Cochise County area. Although the majority of aircraft activity will continue to be single and twin-engine aircraft, the forecasts reflect the increasing trend toward use by turbine aircraft.

The ultimate aircraft fleet mix which is also shown in Table 2.3 has been determined using the percentages inherent at Cochise County and in conjunction with national aviation trends.

Table 2.3
Ultimate Aircraft Mix by Classification*
(Operations)

a. **Aircraft Approach Category.** An aircraft approach is a grouping of aircraft based on an approach speed. The aircraft approach categories percentage is of based aircraft at the Cochise County Airport.

Utility Aircraft:

1. Category A: Speed less than 91 knots 85.0%
2. Category B: Speed 91 knots or more, but less than 121 knots 12.0%

Transport Aircraft:

3. Category C: Speed 121 knots or more, but less than 141 knots 3.0%
4. Category D: Speed 141 knots or more, but less than 166 knots 0%
5. Category E: Speed 166 knots or more 0%

b. **Airplane Design Group (Physical Characteristics).** The airplane design group subdivides airplanes by wingspan. The airplane design group concept links an airport's dimensional standards to aircraft approach categories or to airplane design groups or to runway instrumentation configurations.

1. Airplane Design Group I: Wingspan up to but not including 49 feet (15m) 85.0%
2. Airplane Design Group II: Wingspan 45 feet (15m) up to but not including 79 feet (24m) 15.0%
3. Airplane Design Group III: Wingspan 79 feet (24m) up to but not including 118 feet (36m) 0%
4. Airplane Design Group IV: Wingspan 118 feet (36m) up to but not including 171 feet (52m) 0%
5. Airplane Design Group V: Wingspan 171 feet (52m) up to but not including 214 feet (60m) 0%
6. Airplane Design Group VI: Wingspan 214 feet (60m) up to but not including 0%

* Per A/C 150/5300-13, Does not include military operations.

ANNUAL INSTRUMENT APPROACH FORECAST

The forecast of Annual Instrument Approaches (AIAs) provides further guidance in determining the Airport's requirements for additional facilities, and is especially important for type and extent of navigational guidance equipment. An instrument approach is defined as "an approach to an airport, with intent to land, by an aircraft in accordance with an Instrument Flight Rule (IFR) flight plan, when the visibility is less than three miles and/or the ceiling is at or below the minimum initial approach altitude."

The forecasts for AIAs assumes a percentage of annual instrument approaches conducted by a determined level of itinerant traffic. As an average, the Airport and the Cochise County area experiences Instrument Meteorological Conditions (IMC) 0.3%[3] of the time. IMC is based upon visibility at 1,000 feet and at or less than 3 miles.

Itinerant AIA = (Total Itinerant Operations) x (% IFR Airport Operations) x (% IFR Related Pilots)

The percent increase for IFR rated pilots is contributed to the forecast increase of more pilot training (2.9% annually during the next 12 years) in addition to more sophisticated twin-engine and turbine aircraft forecast to use at the Airport. Table 2.4 summarizes the forecast of annual instrument approaches through the planning period.

Table 2.4
Annual Instrument Approach Forecast
Cochise County Airport

Year	Total Itinerant *	Percent IFR	Percent IFR Rated Pilots	Annual Operations During IMC	Annual IMC Approaches
Existing	4,010	0.3	45%	54	27
2002	4,140	0.3	50%	62	36
2007	4,280	0.3	55%	70	35
2012	4,809	0.3	60%	86	43
2017	5,534	0.3	65%	108	54

* Includes instrument operations conducted by military.

[3]International Station Meteorological Climate Summary - October 1990

FORECAST SUMMARY

The purpose of this element has been to present forecasts of future aviation activity which will be used to guide the continued development of the Cochise County Airport. These forecast figures are summarized in Table 2.5.

General aviation based aircraft at Cochise County are expected to increase at a similar pace as the local economic growth indicators. There are signs of modest but steady economic growth in Cochise County which will in turn increase the number of general aviation based aircraft at Cochise County Airport.

Total aircraft operations are projected to increase by 30 percent during the planning horizon. The greatest increase in operations will occur in the later part of the planning period due to positive growth figures for general aviation as identified in the forecasts of aviation demand. In the next chapter, these forecast figures will be used to develop facility recommendations which will identify the future facility requirements at the Airport.

Table 2.5
Summary - Aviation Forecasts
Cochise County Airport (Willcox)
Cochise County, Arizona

Airport Activity	1997 (Existing)	2002 (5-yr)	2007 (10-yr)	2012 (15-yr)	2017 (20-yr)
BASED AIRCRAFT	24	24	25	28	34
Single Engine (A-I)	22	22	23	25	29
Multi-Engine (B-II)	2	2	2	3	5
Business Jet (B-II, C-II)	0	0	0	0	0
AIRCRAFT OPERATIONS	7,000	7,000	7,250	9,060	9,680
Local Operations (Total)	2,990	2,860	2,970	3,251	4,146
Itinerant Operations (Total) *	4,010	4,140	4,280	4,809	5,534
ANNUAL INSTRUMENT APPROACHES (AIA's)	27	36	35	43	54
AIRPORT REFERENCE CODE (ARC)	B-II	B-II	B-II	B-II	B-II

* Includes Military